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International Application No. PCT/SG 2004 / 000013

International Filing Date 14 JAN 2004 (14-01-2004)

REGISTRY OF PATENTS (SINGAPORE)
PCT INTERNATIONAL APPLICATION
Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference *(if desired) (12 characters maximum)* FP2135

Box No. I TITLE OF INVENTION

METHOD OF DATA ENTRY FOR INDIC LANGUAGES

Box No. II APPLICANT ☒ This person is also inventor

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)*

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Telephone No.

Facsimile No.

Teleprinter No.

Applicant's registration No. with the Office

State *(that is, country)* of nationality: India

State *(that is, country)* of residence: Singapore

This person is applicant for the purposes of: ☒ all designated States ☐ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)*

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This person is:
☐ applicant only
☒ applicant and inventor
☐ inventor only *(If this check-box is marked, do not fill in below.)*

Applicant's registration No. with the Office

State *(that is, country)* of nationality: India

State *(that is, country)* of residence: Singapore

This person is applicant for the purposes of: ☒ all designated States ☐ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

☐ Further applicants and/or (further) inventors are indicated on a continuation sheet.

Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as: ☐ agent ☐ common representative

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)*

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☐ **Address for correspondence:** Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

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(The check-boxes above may be used to exclude (irrevocably) the designations concerned in order to avoid the ceasing of the effect, under the national law, of an earlier national application from which priority is claimed. See the Notes to Box No. V as to the consequences of such national law provisions in these and certain other States.)

Box No. VI PRIORITY CLAIM

The priority of the following earlier application(s) is hereby claimed:

Filing date of earlier application *(day/month/year)*	Number of earlier application	Where earlier application is:		
		national application: country or Member of WTO	regional application:* regional Office	international application: receiving Office
item (1)				
item (2)				
item (3)				

☐ Further priority claims are indicated in the Supplemental Box.

The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) *(only if the earlier application was filed with the Office which for the purposes of this international application is the receiving Office)* identified above as:

☐ all items ☐ item (1) ☐ item (2) ☐ item (3) ☐ other, see Supplemental Box

** Where the earlier application is an ARIPO application, indicate at least one country party to the Paris Convention for the Protection of Industrial Property or one Member of the World Trade Organization for which that earlier application was filed (Rule 4.10(b)(ii)):* ....

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Choice of International Searching Authority (ISA) *(if two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used)*:

ISA / AT

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Date *(day/month/year)* Number Country *(or regional Office)*

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The following declarations are contained in Boxes Nos. VIII (i) to (v) *(mark the applicable check-boxes below and indicate in the right column the number of each type of declaration)*: Number of declarations

☐ Box No. VIII (i)	Declaration as to the identity of the inventor	:
☐ Box No. VIII (ii)	Declaration as to the applicant's entitlement, as at the international filing date, to apply for and be granted a patent	:
☐ Box No. VIII (iii)	Declaration as to the applicant's entitlement, as at the international filing date, to claim the priority of the earlier application	:
☐ Box No. VIII (iv)	Declaration of inventorship (only for the purposes of the designation of the United States of America)	:
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Box No. IX CHECK LIST; LANGUAGE OF FILING

This international application contains:

(a) in paper form, the following number of sheets:

request (including declaration sheets)	:	3
description (excluding sequence listing and/or tables related thereto)	:	8
claims	:	3
abstract	:	1
drawings	:	7
Sub-total number of sheets	:	22
sequence listing	:	
tables related thereto	:	
(for both, actual number of sheets if filed in paper form, whether or not also filed in computer readable form; see (c) below)		
Total number of sheets	:	22

(b) ☐ **only in computer readable form** (Section 801(a)(i))
- (i) ☐ sequence listing
- (ii) ☐ tables related thereto

(c) ☐ **also in computer readable form** (Section 801(a)(ii))
- (i) ☐ sequence listing
- (ii) ☐ tables related thereto

Type and number of carriers (diskette, CD-ROM, CD-R or other) on which are contained the
- ☐ sequence listing: .....
- ☐ tables related thereto: .....

(additional copies to be indicated under items 9(ii) and/or 10(ii), in right column)

This international application is accompanied by the following item(s) *(mark the applicable check-boxes below and indicate in right column the number of each item)*: | Number of items

1. ☐ fee calculation sheet :
2. ☐ original separate power of attorney :
3. ☐ original general power of attorney :
4. ☐ copy of general power of attorney; reference number, if any: ..... :
5. ☐ statement explaining lack of signature :
6. ☐ priority document(s) identified in Box No. VI as item(s): ..... :
7. ☐ translation of international application into *(language)*: ..... :
8. ☐ separate indications concerning deposited microorganism or other biological material :
9. ☐ sequence listing in computer readable form *(indicate type and number of carriers)*
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   - (iii) ☐ together with relevant statement as to the identity of the copy or copies with the sequence listing mentioned in left column :
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    - (i) ☐ copy submitted for the purposes of international search under Section 802(b-*quater*) only (and not as part of the international application) :
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    - (iii) ☐ together with relevant statement as to the identity of the copy or copies with the tables mentioned in left column :
11. ☒ other *(specify)*: PF.48 ..... : 1

Figure of the drawings which should accompany the abstract: Fig.1

Language of filing of the international application: English

Box No. X SIGNATURE OF APPLICANT, AGENT OR COMMON REPRESENTATIVE

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).

Timothy Watkin

TIMOTHY WATKIN

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1. Date of actual receipt of the purported international application: 14 JAN 2004 (14-01-2004)
2. Drawings: ☐ received: ☐ not received:
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4. Date of timely receipt of the required corrections under PCT Article 11(2):
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Method of data entry for Indic languages

Field of the invention

The present invention relates to methods for inputting text written in an Indic language into a computer apparatus.

Background of Invention

The Indic group of languages includes Bengali, Hindi, Tamil, Punjabi, Gurmukhi, Gujarati and others, all of which are historically descended from Sanskrit. One unambiguous definition of the term "Indic language" is languages which are written using the Indic fonts defined by Unicode version 4.0.

Conventionally, when text written in an Indic language is to be entered into a computer system it is done using a keyboard having keys for respective Indic characters. The number of Indic characters is rather higher than in English, however, so such keyboards tend to be difficult to use. This is particularly true because of a peculiarity of Indic languages, that 2 characters may be joined together to form one. Furthermore, "vowel modifiers" may be required to be attached to characters in order to form a word properly. This has discouraged many people, including people who can only write in Indic text, from using an Indic language as a means to communicating using computer systems, such as via chat or by producing documents.

Furthermore, such keyboards are not common in countries where Indic languages are not in common use.

Also, a writer who wishes to write script in both English and an Indic language is required to employ two keyboards. Apart from the expense of providing two keyboards, switching between them as required is inconvenient.

Summary of the Invention

The present invention aims to provide a new and useful technique for entering Indic language text into a computer system.

In general terms, the invention proposes an Indic text entry program which runs on a computer system simultaneously with application software adapted to receive Indic text. The Indic text entry program provides a graphical user interface on a screen of the computer system. A user selects successive Indic characters using a data input device (such as a mouse) which employs the graphical user interface. The successively selected characters are presented in the graphical user interface until, in response to a command from the user, the characters are transferred to the application software.

Thus, Indic text can be input to the application software without use of a specially adapted keyboard (or indeed any keyboard at all). Optionally, the computer system can however be provided with a keyboard, for example a Roman alphabet keyboard, for inputting additional text into the application software (e.g. text in English).

Preferably, the graphical user interface presents the user with a number of first characters. Upon selecting one of the first characters, the text entry program presents the user with a number of modifier characters compatible with the first character. Upon the user selecting one of the modifier characters, the text entry program forms the combination of the first character with the modifier characters.

The application software adapted to receive the Indic text may for example be conventional software such as Wordpad, Microsoft Word, Notepad, or Hotmail Messenger. Furthermore, it may be any software which is adapted to receive Unicode characters, such as characters according to the Unicode 4.0 standard. However, other embodiments are possible in which the Indic text entry program and the application software are supplied together as a single commercial software product, providing a first screen area for receiving Indic text and a separate screen area which is used for selecting the Indic characters as described above.

The text entry program and application software both run on the computer system in the same operating system. Preferably, this operating system is Windows, in one of its various editions, such as Windows 2000, or Windows XP supporting Unicode.

Preferably, as the characters are successively input the text entry program compares the previously selected characters to a dictionary of items (words and perhaps also phrases), and presents to the user one or more items from the dictionary which are compatible with the selected characters. The user is able to select one of the presented item, thus saving him or her the labour of completing the entry of all characters of the item he or she was intending to type.

In cases when there are multiple items in the dictionary which are compatible with the selected letters (in particular a number of items which is too large for them all to be displayed in a region of the graphical user interface reserved for displaying these compatible items), the text entry program may present only a selection of them to the user. This subset may be selected based on a frequency index associated with each item, such that the user is presented

with the compatible items having the highest frequency. Similarly, the text entry program may order the items which it presents to the user according to the frequency index, e.g. such that the item having the highest frequency index is top of the list.

The user may be able to vary the selection of items shown to him. For example the interface may include a scroll bar, such that by "moving" the scroll bar (e.g. using the mouse), a different set of compatible elements may be displayed in the interface.

Brief Description of The Figures

Preferred features of the invention will now be described, for the sake of illustration only, with reference to the following figures in which:

Fig. 1 shows the screen in an embodiment of the invention for the Indic language Bengali;

Fig. 2 shows the graphical user interface of the text entry program of the embodiment at a moment in the text selection process;

Fig. 3 is a flow diagram of the operation of the embodiment;

Figs. 4 to 7 show how the graphical user interface of Fig. 2 is modified in the case of different Indic langauges.

Detailed Description of the embodiments

The embodiment of the invention may be a conventional computer system, such as a personal computer (PC). Referring to Fig. 1, the screen of the PC is shown. It has a first window, at the top of the screen, which is a conventional software application (WordPad is shown) capable of receiving Indic text in an area labelled 11. Simultaneously, the computer is running a text entry

program which presents a graphical user interface which is the window headed "Click n Write". This window is suitable for use in the case of entering text in Bengali

The "Click n Write" window includes a section 1 for displaying one or more characters selected by a user. It also includes a section 2 for displaying items from a dictionary of Indic words (and optionally also phrases) consistent with the characters displayed in section 1.

The area of the "Click n Write" window to the left of the section 2 includes a section 3 displaying Indic consonants, a section 4 displaying various signs, and a section 5 displaying Indic vowels. The user can select one of the symbols in the sections 3, 4, 5 by moving an arrow operated by a mouse over the symbol and left-clicking.

Suppose for example that the user moves the arrow over the consonant at the top left of the section 3 and left-clicks to select it, the display then is as shown in Fig. 2. In section 2 a list is shown of items in the dictionary (i.e. beginning with the selected consonant). These items are selected from a dictionary of items consistent with the selection of characters the user has made, and include also items beginning with the selected character combined with a modifier character. Each item in the dictionary is associated with a frequency index, and of all items in the dictionary consistent with the selected character(s) in section 1, the ones are presented having the highest value of this index. Optionally, they are presented in section 2 in descending order of this index.

Also, upon the user left clicking on the consonant at the top left of section 3, the graphical user interface displays a column of symbols indicated in the column 12, which is mainly a list of modifiers for the selected consonant. The

user can select any of these modifiers by left clicking on it. The final item in the column 12 ("—") is such that if a user moves the arrow over this character a second set of vowel modifiers 13 is displayed, and the user can select one of these by clicking on it. Once a vowel modifier is selected, the list of suggestions in section 2 is changed and section 1 now displays the selected consonant as modified by the selected vowel modifier. Note that, according to the convention of Indic languages, the consonant is often modified by the modifier appearing to the left of the consonant it modifies. If instead of these selections, or following these selections, the user clicks on one of the items in region 2, that item is transferred to the section 1.

The user may then repeat these steps to successively add further characters to the section 1.

Referring again to Fig. 1, if the user clicks on button 8, the last character entered into section 1 is deleted. If the user clicks on button 9, the characters entered in the section 1 are all deleted. If the user clicks on "enter" button 10, the contents of the section 1 are transferred to the area 11. Normally, the area 11 includes a cursor, and the text is transferred to the location indicated by the cursor.

The user can select numerals by selecting from a first drop down menu 7, and can select certain other pre-specified additions (e.g. punctuation characters) from a second drop down menu 6. Optionally, these characters, once selected using the menus 6, 7, may be transferred to the area 11 without the user issuing a separate command.

Referring to Fig. 3, the flow diagram of the embodiment is shown showing how a user generates an item and transfers it to the area11. These steps are

performed at a time when the application software and the Indic text entry program are both running.

In step 1, the user clicks on a location within an area 11 of the window of the application software to indicate a location where text is to be added.

In step 2, the user selects a first character using the sections 3, 4, 5 (and, in the case that the user selects a consonant from section 5, optionally using the column 12, and possibly also 13 to select modifiers for the character).

In step 3, the Indic text entry program displays in section 2 a number of items consistent with the selected characters, and the user determines whether one of those items is what he or she intended to type (step 4). If so, then in step 5 he selects that item by clicking on it. It is then displayed in section 1 of the "Click n Write" window. In step 7, the user issues a command, e.g. clicking on the enter button 10 or a right-click on the mouse, to send the selection to the cursor position in the area 11.

If however, the item the user intended to type is not one of the suggestions in section 2, then if there are not characters to be entered (i.e. option "no" in choice 6) the program loops back to step 3 in which the user selects a further character. The text entry program then presents a further list of possible items in the section 2. If one of these is the item the user wanted to type, he selects it by clicking on the item in the section 2 (step 4). Otherwise, he may select a further character, i.e. the flow loops back again from choice 6 to step 3.

If, following any step 2, the user has reached the end of the item he was trying to type (e.g. because it is absent from the dictionary) then he can click on the button 10 or right click to transfer the text at once to the area 11 (i.e. the choice "YES" in step 6. That is, he can jump to step 7.

In step 8 the text entry program checks whether the text being transferred is not in the dictionary. If so, the process ends. If not, in step 9 the text entry program will suggest that it is entered there (e.g. by generating a text box with clickable areas marked "yes" and "no"). If the user decides not, the process ends. If the user decides to enter the item in the dictionary (e.g. clicks on "yes") it is added there, step 10, and the process ends.

Note that the "END" of the process in Fig. 3 means that the user has successfully generated an item in the area 11. If this is not the end of the text the user wanted to input, the process of Fig. 3 begins again. That is, by default, the END of Fig. 3 is followed by a return to step 1, for the generation of a further item.

Although only a single embodiment of the invention has been described, many variations are possible within the scope of the invention as will be clear to a skilled reader. For example the flow diagram of Fig. 3 can be modified in various ways, such as by having the flow move from step 5 to step 6, such that the user is able to add one or more further characters to the item in section 1 selected from the dictionary, or modify it by deleting and/or adding characters, before issuing the command to transfer the text from section 1 to area 11.

Furthermore, the embodiment may be adapted to different Indic languages. For example, Figs. 4 and 5 show how the interface may appear in the case of Hindi. Fig. 4 shows a moment before any characters are entered, and Fig. 5 shows a moment corresponding to that of Fig. 2. Figs. 6 and 7 show respectively the cases that the Indic language is Gurmukhi and Gujarati.

Claims

1. A computer system for input of Indic text, the computer system comprising a screen and a data entry device for screen-based data entry, the computer system being adapted to simultaneously run an Indic text entry program and application software adapted to receive Indic text, the computer system including a screen and a data entry device for screen-based data entry,

the Indic text entry program, when run by the computer system:

(i) generating a graphical user interface on the screen,

(ii) upon a user successively selecting Indic characters using the data input device and the graphical user interface, presenting the successively selected characters in a display area of the graphical user interface,

(iii) comparing the selected characters to a dictionary of items, and presenting to the user items from the dictionary are compatible with the selected characters;

(iv) upon the user selecting one of the presented items, registering the selection; and

(v) upon a command from the user, transferring the text to the application software.

2. A computer system according to claim 1 in which the graphical user interface presents the user with a number of first characters, the text entry program, upon selecting one of the first characters, presenting the user with one or more modifier characters compatible with the first character, and upon the user selecting one of the modifier characters, forming a combination of the first character with the modifier character.

3. A computer system according to claim 1 or claim 2 in which, when there are multiple items in the dictionary which are compatible with the selected characters, the text entry program presents only a selection of them to the user based on a frequency index associated with each item.

4. A computer system according to claim 3 which is operative to enable the user to vary the selection of compatible items.

5. A computer system according to claim 3 or claim 4 in which the text entry program orders the selected items according to the frequency index with the highest frequency words appearing at the top.

6. A computer system according to any preceding claim further including a keyboard for inputting additional text into the application software.

7. A computer system according to claim 6 in which the keyboard is a Roman alphabet keyboard.

8. A computer system according to any preceding claim in which the application software is one of Wordpad, Microsoft Word, Notepad, Yahoo chat, or Hotmail Messenger.

9. A Indic text entry program to be run on a computer system simultaneously with application software adapted to receive Indic text, the computer system including a screen and a data entry device for screen-based data entry,

the Indic text entry program when run by the computer system

(i) generating a graphical user interface on the screen,

(ii) upon a user successively selecting Indic characters using the data input device and the graphical user interface, presenting the successively selected characters in the graphical user interface, and

(iii) comparing the selected characters to a dictionary of items, and presenting to the user items from the dictionary are compatible with the selected characters;

(iv) upon the user selecting one of the presented items, registering the selection; and

(v) upon a command from the user, transferring the text to the application software.

Fig. 1

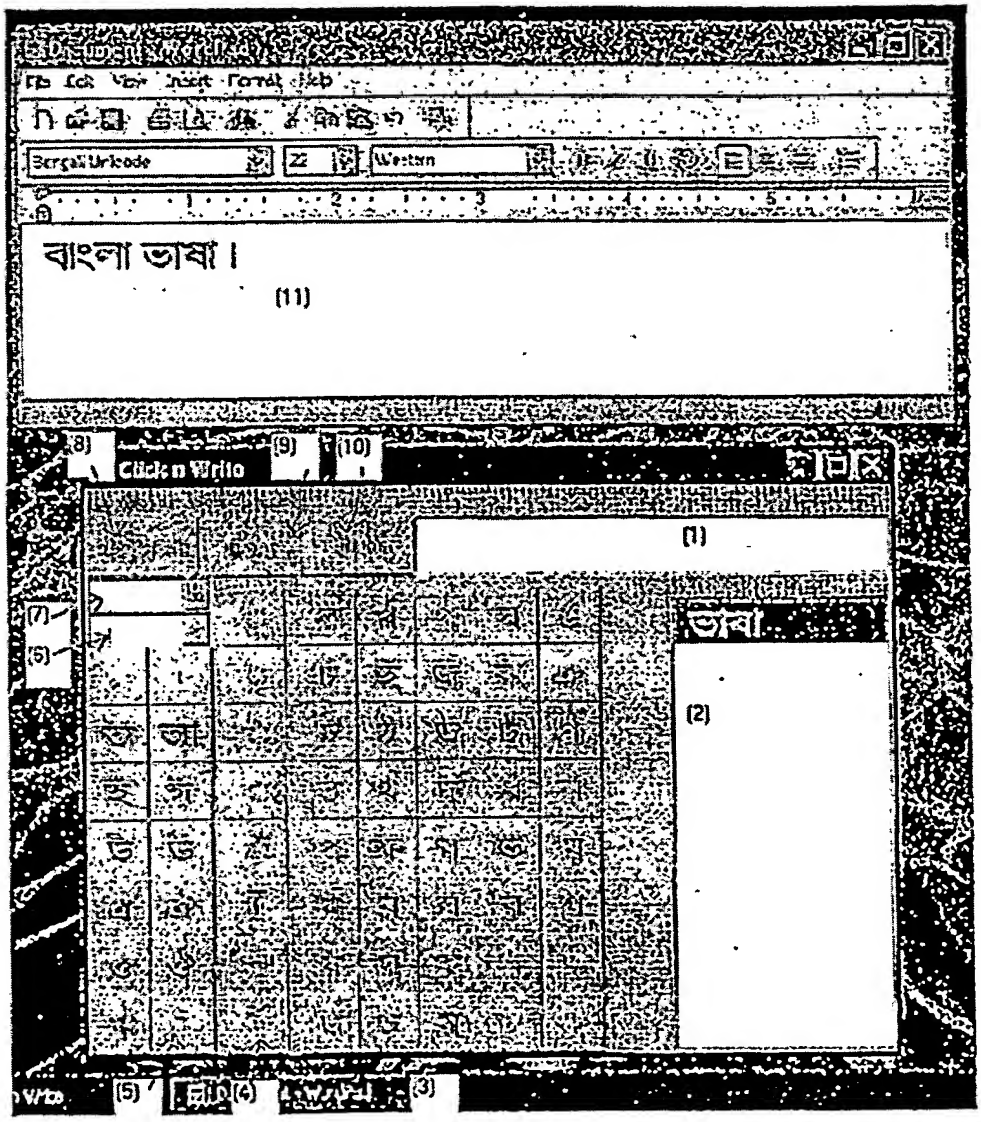


Fig. 2

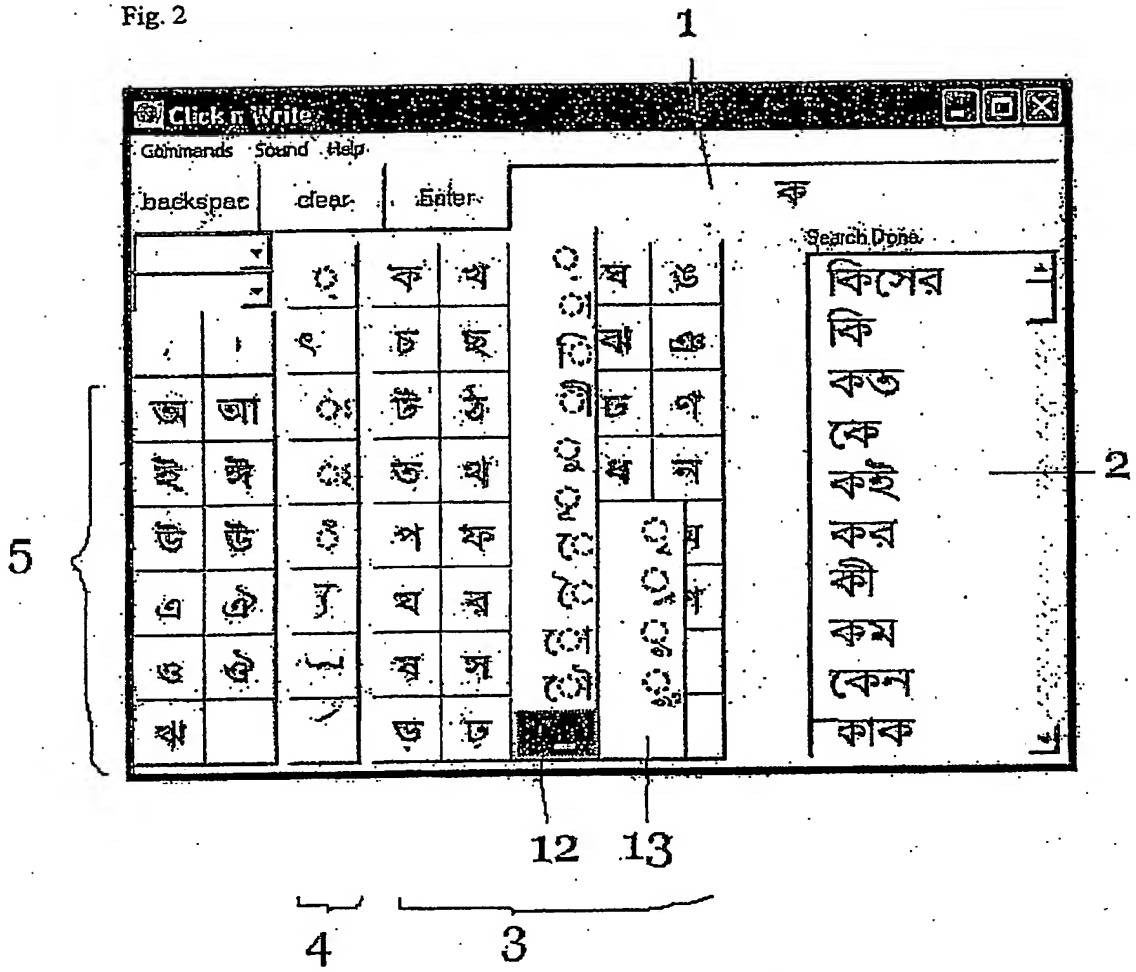

1
Click n Write
Commands Sound Help
backspac
clear
Enter
Search Done
কিসের
কি
কত
কে
কই
কর
কী
কম
কেন
কাক
2
5
12
13
4
3

Fig. 3

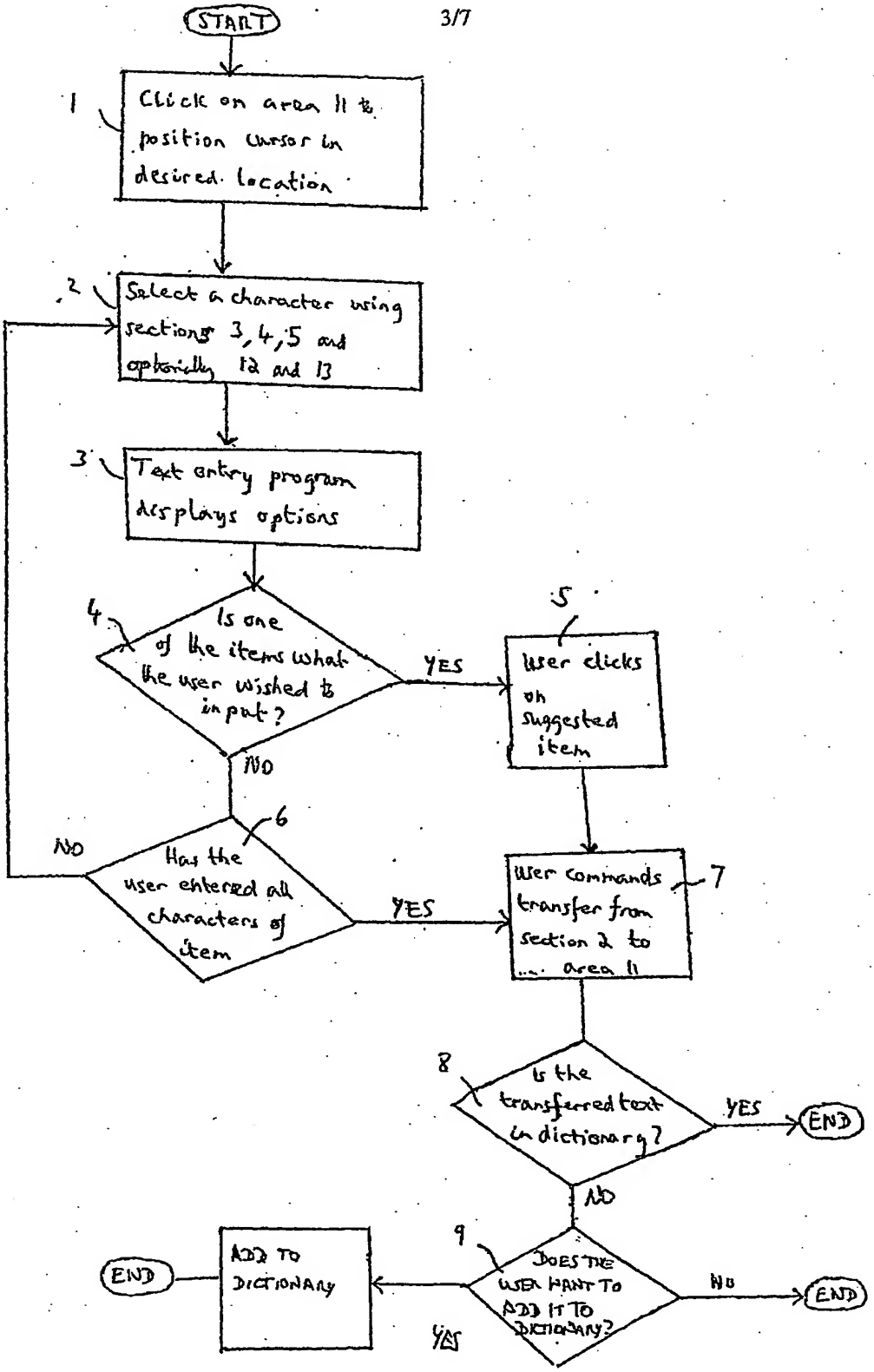

START
1
Click on area 11 to position cursor in desired location
2
Select a character using sections 3, 4, 5 and optionally 12 and 13
3
Text entry program displays options
4
Is one of the items what the user wished to input?
YES
5
User clicks on suggested item
NO
6
Has the user entered all characters of item
NO
YES
7
User commands transfer from section 2 to ... area 11
8
Is the transferred text in dictionary?
YES
END
NO
9
DOES THE USER WANT TO ADD IT TO DICTIONARY?
NO
END
YES
ADD TO DICTIONARY
END

Fig. 4

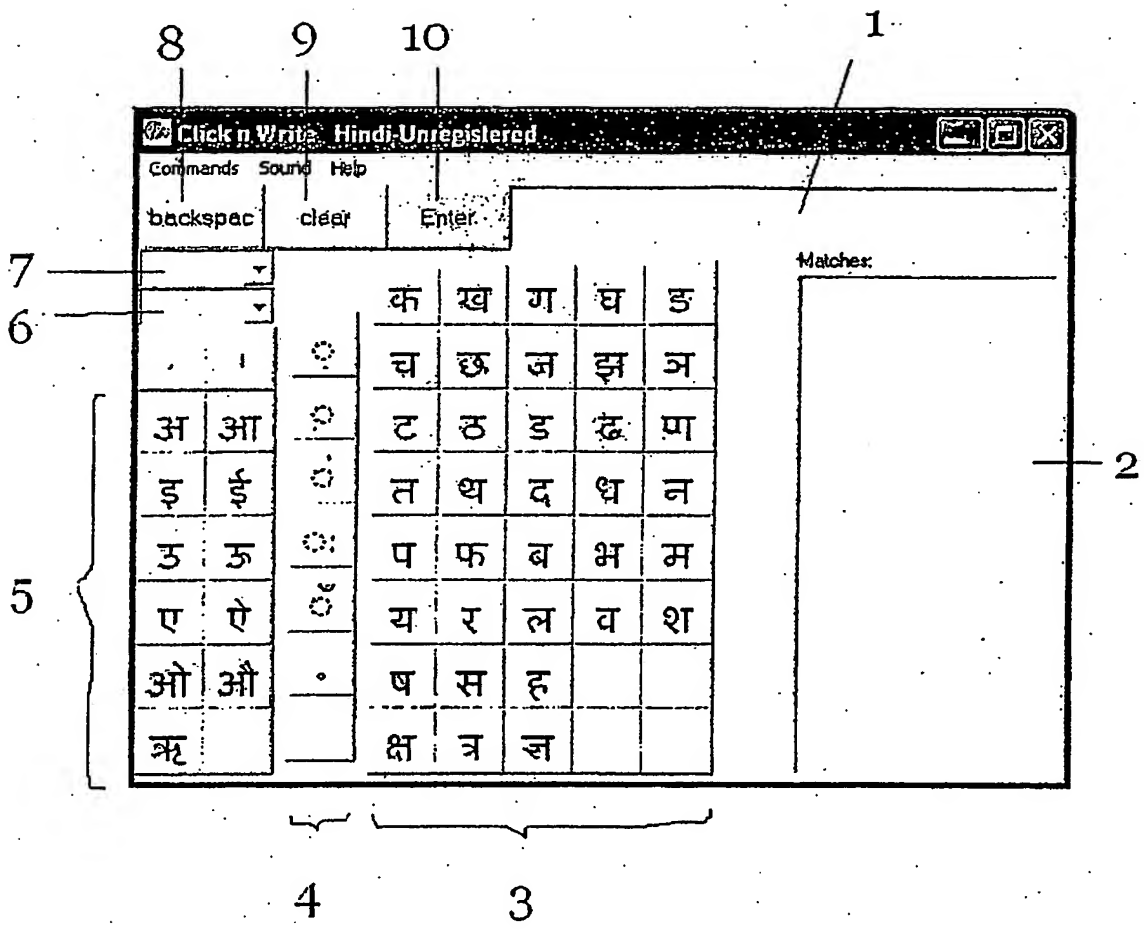
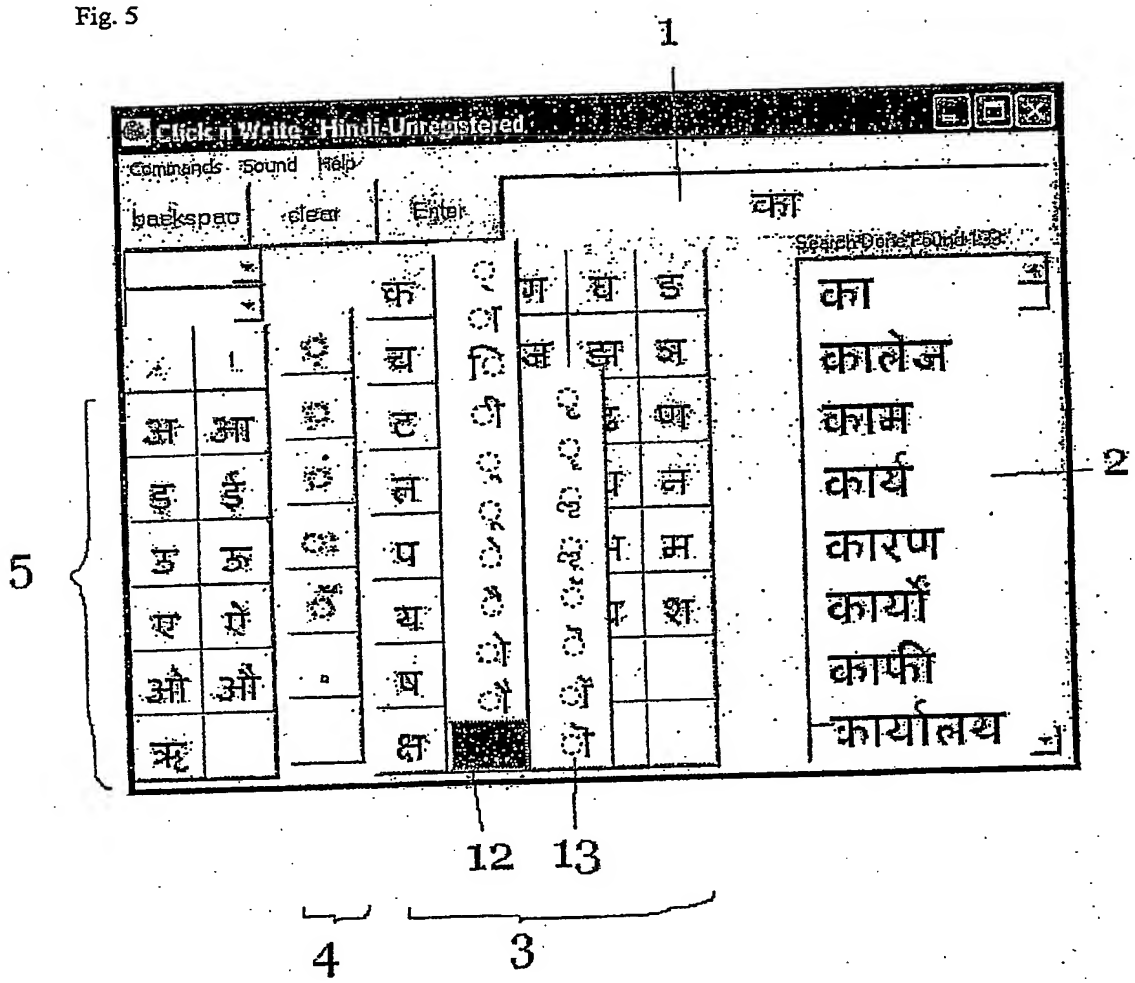

8
9
10
1
Click n Write Hindi-Unregistered
Commands
Sound
Help
backspac
clear
Enter
Matches:
7
6
2
5
4
3

Fig. 5


1
Click n Write Hindi-Unregistered
Commands Sound Help
backspac
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Enter
का
कालेज
कार्य
कारण
कार्यों
कार्यालय
2
5
12
13
4
3

Fig. 6

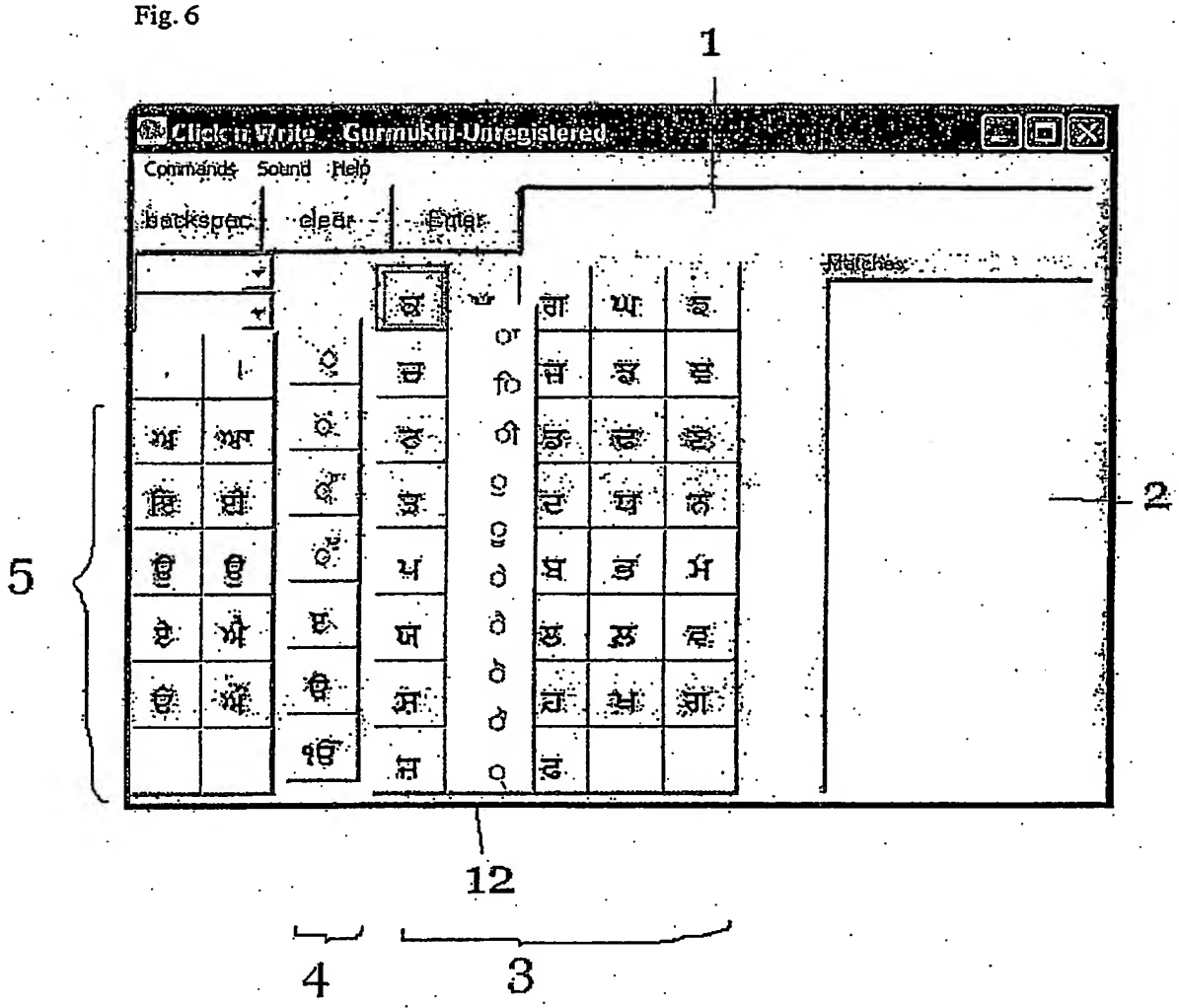
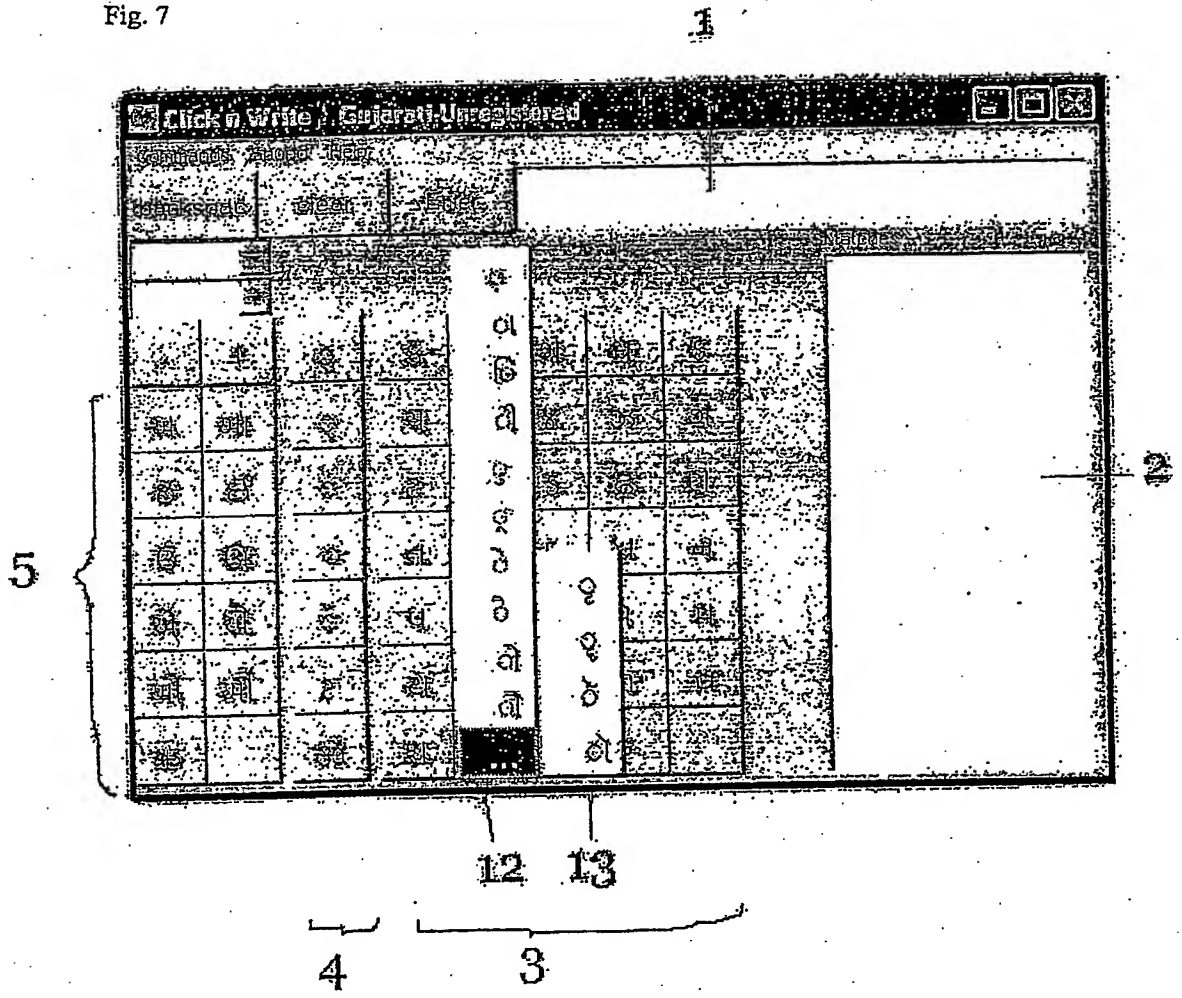

1
Click n Write - Gurmukhi-Unregistered
Commands Sound Help
Backspace
clear
Enter
Matches
2
5
12
4
3

Fig. 7



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